

## **REMARKS**

Reconsideration of the above-identified application, as amended, is respectfully requested.

In the Office Action of June 1, 2007, the Examiner rejected Claims 1, 2, 4, 5 and 18 under 35 U.S.C. §103(a), as being allegedly unpatentable over Sugawara et al. (U.S. 5,438,421) ("Sugawara") in view of Yutaka (JP55-166625) ("Yutaka"). Further in the Office Action, the Examiner rejected Claims 1, 2, 4, 5 and 18 under 35 U.S.C. §103(a), as being allegedly unpatentable over Sugawara in view of Ryujiro (JP56-138716) ("Ryujiro").

Further in the Office Action, the Examiner rejected Claims 6,7 and 9-11 under 35 U.S.C. §103(a), as being allegedly unpatentable over Sugawara in view of Yutaka and further in view of Bryan-Brown et al. (U.S. Patent No. 5,917,570) ("Bryan-Brown"). Further in the present Official Action, the Examiner rejected Claims 6,7 and 9-11 under 35 U.S.C. §103(a), as being allegedly unpatentable over Sugawara in view of Ryujiro and further in view of Bryan-Brown.

Further in the Office Action, the Examiner rejected Claims 3 and 8 under 35 U.S.C. §103(a), as being allegedly unpatentable over Sugawara in view of Yutaka and further in view of Callegari et al. (U.S. Patent No. 6,020,946). Additionally, the Examiner rejected Claims 3 and 8 under 35 U.S.C. §103(a), as being allegedly unpatentable over Sugawara in view of Ryujiro and further in view of Callegari.

As a preliminary matter, applicant respectfully requests entry of this amendment as the Examiner has only cited the Yutaka and Ryujiro references for the first time in the present office action.

In response to the rejection of independent Claim 1, Applicant respectfully disagrees.

As a preliminary matter, Claim 1 is being canceled and the subject matter of canceled Claim 1 is being wholly incorporated in Claim 4, now amended and re-cast in independent form.

Claim 4, is directed to an embodiment of an LCD cell structure having two substrates - both with the IB treated alignment film layer, with only a single substrate having a grooved surface profile to align the LC molecules. In this embodiment, only a single substrate having a grooved profile is sufficient as alignment is enabled by the ion beam and the grooves are for breaking symmetry to eliminate 90 degree meta stable states. Further in this regard, Claim 4 has been amended to further clarify that the LC material at the surface of the alignment film layer has an increased alignment force for constraining deposited LC material to an alignment direction parallel to the grooves. A further clarification now recited in amended Claim 4, is that the LC molecules align parallel to the alignment direction of the second substrate disposed opposite the first substrate. Respectfully, no new matter is being entered in the amendment to Claim 4 as the recited "alignment direction" is parallel to the groove direction.

Now in the Final Rejection, the Examiner had rejected Claim 4 based on the prior art to Sugurawa – particularly the Examiner alleged that Fig. 21 ref. 41 of Sugurawa teaches the second aligned substrate (opposite the first substrate) includes a top alignment layer (Fig. 21 reference 35) having a flat surface profile. Applicants respectfully disagree as Fig. 21 of Sugurawa shows two substrates – each having a flat orientation film layer 45, but no grooved surface.

Applicants fail to see a teaching or suggestion in Sugurawa that addresses a LCD cell structure having two substrates, wherein a first substrate has a grooved surface profile including alignment film layer formed thereon subjected to the ion beam treatment (Claim 4) and wherein the second substrate has a flat surface profile.

To the contrary, in the present invention, now claimed in amended Claim 4, the alignment is re-created by the ion beam treatment not the grooves. The purpose of the groove is to break symmetry between the ion beam direction and the direction perpendicular to ion beam (both in the plane of the substrate). With the symmetry breaking on one surface, the asymmetry near the grooved surface will propagate to the other flat surface due to the elastic coupling between the liquid crystal molecules. The 90 degree meta-stable state is therefore eliminated.

In fact, applicants respectfully submit that Sugawara will not work with one grooved surface as Sugawara requires the grooved surface as alignment layer for liquid crystals, and without grooves there is no alignment - therefore no usable liquid crystal display. That is, Sugawara will not work since the liquid crystal on the second surface will not have alignment, and the device will have very poor or no contrast and therefore is not usable. Moreover, each of the LCD cell structure embodiments described in Sugurawa (Figs. 10-41 of Sugurawa) requires that each substrate surface have a grooved surface or, as in the prior art teaching (Fig. 21 of Sugurawa), each substrate surface has a flat surface profile. There appears no teaching of a LCD cell structure such as now claimed in amended Claim 4 that only includes a single substrate surface having a grooved surface profile having an alignment film layer treated by ion bombardment in a direction parallel to the grooves. That is, a single grooved surface layer profile having the alignment layer formed and described according to the invention is sufficient to enable LC molecules to align parallel to the alignment direction for enhanced LCD performance.

Respectfully, no new matter is being entered by this amendment nor are new issues being raised as Claim 4 has already been searched and considered. Furthermore, in light of

the cancellation of Claim 1, remaining independent claims are being amended to properly depend upon Claim 4, now re-cast in independent form.

In view of the foregoing, Applicants respectfully submit that the Claim 4 is distinct over all of the prior art references cited and patentable thereover.

Moreover, notwithstanding the patentability of amended Claim 4, applicants agree with the Examiner that Sugurawa does not teach or suggest the elimination of 90° meta-stable alignment states at the surface. However, respectfully, the additional cited references applied by the Examiner in combination with Sugurawa, i.e., Yutaka and Ryijiro, do not render Claim 4 (incorporating subject matter of rejected Claim 1) obvious. First of all, both Yutaka and Ryijiro are not concerned with the implanting direction of an ion beam treatment, i.e., it only teaches a film application formed by spraying or dipping (See Yutaka) and then a drying process to increase adhesiveness to a flat substrate (electrode) surface. Yutaka only suggests that this method will only “permit” an improvement in perpendicular orientation characteristic, in a vertical direction to the plane of substrate (and not an orientation as in the present invention where the LC molecules are oriented co-planar with the groove surface). Applicants respectfully submit, as the Yutaka and Ryijiro teachings do not address electrodes being subjected to film treatments or applications under a particular direction or control, then neither the Yutaka nor Ryijiro teachings can be said to rise to the level of a teaching of eliminating 90° meta-stable alignment states at the surface of a LCD cell structure as in the present invention.

For these reasons, the Examiner is respectfully requested to withdraw the rejection of Claim 1 (now in combination with Claim 4) as allegedly unpatentable over Sugawara in view of either Yutaka and Ryijiro, and further to withdraw the rejections of all remaining claims in view of their dependency.

In view of the foregoing remarks herein, it is respectfully submitted that this application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance be issued. If the Examiner believes that a telephone conference with the Applicants' attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Steven Fischman', with a long horizontal flourish extending to the right.

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